

## Editorial

### The Portrait of Wassily Leontief

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Among a dozen of portraits of Wassily Leontief that I have seen, I found the one shown on the cover of this issue to be the most impressive. Look at the deep furrows in his forehead (that must have been gained over his hard life spanning from St. Petersburg to New York), the warm but penetrating stare of his dark, gloomy eyes contrasting with the grey hair, as in a contemplative image of an old scholar, and, most of all, the firmly closed lips and the forefinger that made it look as if he was just about to tell us something sober. This is a portrait of an old scholar calling for vigilance, isn't it. What were the words that Wassily Leontief was about to say? Unfortunately, I could find no information regarding the circumstances under which the portrait was taken. But imagine that he was about to speak in front of the Life Cycle Assessment (LCA) community. What might be the words that he would have said? Below is a piece with my conjectures on the basis of his contributions to economics.

Wassily Leontief is best known as the founder of Input-Output Analysis (IOA), an economic discipline that concerns the interrelationships between industries and households through producing and consuming commodities. But his interests were not limited to IOA alone. The contributions to microeconomic theory, international trade, wage contracts, and Keynes' general theory in the 1930s and 1940s have been appreciated and readily absorbed by mainstream economics; he was among the few pioneers in the 1970s who were concerned about the generation of pollutants and its abatements by industrial processes in an economic model. But there were things much more pertinent in his mind as well. During his entire professional life, Wassily Leontief remained a critical opponent to certain theorists. In his presidential address to the American Economic Association, he noted [1]:

Unfortunately, [...] uncritical enthusiasm for mathematical formulation tends often to conceal the ephemeral substantive content of the argument behind the formidable front of algebraic signs.

His words of warning above are still vivid and are gaining even more importance today when economists started to doubt about the rationale of rationality assumption, that has certainly made the life of neo-classical economists much easier. Wassily Leontief was a theoretical economist himself. Nevertheless, his work has generally been attached to firm empirical observations. In the early stage of IOA, he collected primary data on inputs and outputs of an industrial process by himself by visiting industries and interviewing process engineers. In this regard, what he did is quite similar to what LCA practitioners are doing now, except that he was probably more keen on primary data from industries than those who rely mostly on databases. Knowing the difficulties, LCA practitioners, myself included, are perhaps more generous to slightly outdated data than to a small methodological flaw. Wassily Leontief tells us, however, that a sound LCA methodology should be accompanied by reliable, up-to-date data. If an LCA methodology requires the data that cannot be supplied in the necessary quality for an analysis, it can at best be an intellectual exercise.

The importance of system's view is another message that he wished to deliver with his life-long devotion. Explaining the

motivation of formulating the input-output theory in his autobiography to the Nobel foundation he said [2]:

[...] partial analysis cannot provide a sufficiently broad basis for fundamental understanding [...].

The message here is that an analysis based only on a part of the system may be misleading as it neglects the interactions with the embedding system. This is a rather simple message, and anyone would have known it without any economic theory. But when it comes to the question, "then how to model the whole system?", one will face the problem of data and framework. Wassily Leontief provided a solution for both of these problems. The limitation of a partial analysis is not the problem only in economics. The theoretical and empirical ground of so-called cut-off criteria in LCA has been consistently doubted, and many have proposed using IOA instead of a traditional process-LCA. At the beginning, I must say that the mainstream LCA community was not very sanguine about that. Apparently there were a number of problems, including the limited level of resolution, for an IO-LCA to be used as a complete substitute for a process-LCA. Recently, the situation is being changed with the rise of hybrid analysis. LCA software tools are being adapted to enable hybrid analysis, and LCI databases are being extended using IO for their backgrounds. In that sense the LCA community has already started to listen to the advice on the systems' view provided by Wassily Leontief. However, hybrid LCA methodology cannot do anything – bear in mind that the words by Wassily Leontief on the importance of reliable data are still existent. Efforts need to be directed not only to hybrid methodologies, but also to developing and updating basic data and to good case studies. In this regard, an international co-ordination for developing and harmonising a basic input-output database is in the utmost need. For that, the co-operation between the UNEP/SETAC Life Cycle Initiative and SETAC-ISIE working group on IOA and the opening of the new section IO- and hybrid LCA in this journal are major steps forward [3].

In a way, one's theory reflects what one has deep in mind as much as one's portrait does. IOA by Wassily Leontief can likewise be said to be a crystallisation of what he believed to be right, notably the two mentioned above. The theory of IOA certainly has both strengths and weaknesses. Regardless of whether an IOA is used or not, however, I believe that the two messages above that Wassily Leontief constantly wished to deliver deserve attention by the LCA community.

Finally, on behalf of all our members of the editorial board, it is my privilege to say Happy New Year!

#### References

- [1] Leontief W (1971): Theoretical Assumptions and Nonobserved Facts. *American Economic Review* 61 (1) 1–7
- [2] Leontief W: Wassily Leontief – Autobiography. Nobel Foundation, Sweden ([www.nobel.se](http://www.nobel.se), accessed on 18 Dec. 2003)
- [3] Suh S (2003): Call for papers: Input-Output and Hybrid Life Cycle Assessment. *Int J LCA* 8 (5) 257